MOTOROLA

Mobile Workstation 520™

Model F5205

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Commercial, Government and Industrial Solutions Sector

Owner's Manual

68P02962C10-O

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G) Batteries (they carry their own separate limited warranty).
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FCC INTERFERENCE WARNING

The FCC requires that manuals pertaining to Class A and Class B computing devices must contain warnings about possible interference with local residential radio and TV reception. This warning reads as follows:
NOTE: This equipment has been tested and found to comply with limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial or residential environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

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Related Documents

The following manuals provide additional information:

Document Name	Catalog Number	Format
Mobile Workstation 520™ Quick Reference Card	68P02962C11-O	Printed Document
Mobile Workstation 520™ Vehicle Installation Manual	68P02962C15-O	Printed Document and Adobe® Acrobat® (online)
Mobile Workstation 520™ Service Manual	98-08901C36-O	Adobe® Acrobat® (online)
SDK Manual	98-08901C37-O	Adobe® Acrobat® (online)

Safe Handling Instructions

FCC Compliance Notice

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Notational Conventions

Throughout this publication, you will notice the use of warnings, cautions, and notes. These notations are used to emphasize that safety hazards exist, and care must be taken.

Warning

Warning

Indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.

Caution

Indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury. CAUTION may also be used to alert against unsafe practices and property-damage-only accident hazards.

Note

An operational procedure, practice, condition, etc., which it is essential to emphasize.

Safety and General Information

Important information on safe and efficient operation. Read this information before using your radio product.

The information provided in this document supersedes the general safety information contained in user guides published prior to July 2000. For information regarding radio use in a hazardous atmosphere please refer to the Factory Mutual (FM) Approval Manual Supplement or Instruction Card, which is included with radio models that offer this capability.

RF Operational Characteristics

Your radio product contains a transmitter and a receiver. When it is ON, it receives and transmits radio frequency (RF) energy. The radio product operates in the frequency range of 806 MHz to 870 MHz and employs analog and/or digital modulation techniques.

When you communicate with your radio product, the system handling your call may control the power level at which your radio product transmits. The output power level typically may vary over a range from 0.00024 watts to 0.7 watts.

Exposure to Radio Frequency Energy

Your Motorola radio product is designed to comply with the following national and international standards and guidelines regarding exposure of human beings to radio frequency electromagnetic energy:

- United States Federal Communications Commission, Code of Federal Regulations; 47 CFR part 2 sub-part J.
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992.
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition.
- National Council on Radiation Protection and Measurements (NCRP) of the United States, Report 86, 1986.
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998.

- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Radiofrequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999.
- Australian Communications Authority Radiocommunications (Electromagnetic Radiation - Human Exposure) Standard 1999 (applicable to wireless phones only).

To assure optimal radio product performance and make sure human exposure to radio frequency electromagnetic energy is within the guidelines set forth in the above standards, always adhere to the following procedures:

Portable Radio Product Operation and EME Exposure

Antenna Care

Use only the supplied or an approved replacement antenna. Unauthorized antennas, modifications, or attachments could damage the phone and may violate FCC regulations.

DO NOT hold the antenna when the radio product is "IN USE". Holding the antenna affects call quality and may cause the radio product to operate at a higher power level than needed.

Phone Operation

When placing or receiving a phone call, hold your radio product as you would hold a wireline telephone. Speak directly into the microphone.

Two-Way Radio Operation

When using your radio product as a traditional two-way radio, hold the radio product in a vertical position with the microphone one to two inches (2.5 to 5 cm) away from your mouth.

Approved Accessories

For a list of approved Motorola accessories, refer to “Appendix B: Approved Accessories” on page 64.

Electromagnetic Interference/Compatibility

Note

Nearly every electronic device is susceptible to electromagnetic interference (EMI) if inadequately shielded, designed or otherwise configured for electromagnetic compatibility.

Facilities

To avoid electromagnetic interference and/or compatibility conflicts, turn off your radio product in any facility where posted notices instruct you to do so. Hospitals or health care facilities may be using equipment that is sensitive to external RF energy.

Aircraft

When instructed to do so, turn off your radio product when on board an aircraft. Any use of a radio product must be in accordance with applicable regulations per airline crew instructions.

Medical Devices

Pacemakers

The Health Industry Manufacturers Association recommends that a minimum separation of six inches (15 centimeters) be maintained between a handheld wireless radio product and a pacemaker. These recommendations are consistent with the independent research by, and recommendations of, US Food and Drug Administration.

Persons with pacemakers should:

- ALWAYS keep the radio product more than six inches (15 centimeters) from their pacemaker when the radio product is turned ON.
- Not carry the radio product in the breast pocket.
- Use the radio product away from the pacemaker to minimize the potential for interference.
- Turn the radio product OFF immediately if you have any reason to suspect that interference is taking place.

Hearing Aids

Some digital wireless radio products may interfere with some hearing aids. In the event of such interference, you may want to consult your hearing aid manufacturer to discuss alternatives.

Other Medical Devices

If you use any other personal medical device, consult the manufacturer of your device to determine if it is adequately shielded from RF energy. Your physician may be able to assist you in obtaining this information.

Safety and General

Use While Driving

Check the laws and regulations on the use of radio products in the area where you drive. Always obey them.

When using your radio product while driving, please:

- Give full attention to driving and to the road.
- Use hands-free operation, if available.
- Pull off the road and park before making or answering a call if driving conditions so require.

Vehicles with Air Bags

Warning

Do not place a portable radio product in the area over an air bag or in the air bag deployment area. Air bags inflate with great force. If a portable radio is placed in the air bag deployment area and the air bag inflates, the radio product may be propelled with great force and cause serious injury to occupants of the vehicle.

Potentially Explosive Atmospheres

Turn off your radio product prior to entering any area with a potentially explosive atmosphere, unless it is a radio product type especially qualified for use in such areas as "Intrinsically Safe" (for example, Factory Mutual, CSA, or UL Approved). Do not remove, install, or charge batteries in such areas. Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death.

Note

The areas with potentially explosive atmospheres referred to above include fueling areas such as below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles, such as grain, dust or metal powders, and any other area where you would normally be advised to turn off your vehicle engine. Areas with potentially explosive atmospheres are often but not always posted.

Blasting Caps and Areas

To avoid possible interference with blasting operations, turn off your radio product when you are near electrical blasting caps, in a blasting area, or in areas posted: "Turn off two-way radio". Obey all signs and instructions.

Operational Cautions

Antennas

Do not use any radio product that has a damaged antenna. If a damaged antenna comes into contact with your skin, a minor burn can result.

Batteries

Caution

All batteries can cause property damage and/or bodily injury such as burns if a conductive material such as jewelry, keys, or beaded chains touch exposed terminals. The conductive material may complete an electrical circuit (short circuit) and become quite hot. Exercise care in handling any charged battery, particularly when placing it inside a pocket, purse, or other container with metal objects.

Mobile Radio Operation and EME Exposure

To assure optimal radio performance and that human exposure to radio frequency electromagnetic energy is within the guidelines referenced earlier in this document, transmit only when people outside the vehicle are at least the minimum distance away from a properly installed, externally-mounted antenna.

The table below lists the minimum distance for several different ranges of rated radio power.

Rated Power of Vehicle-installed Mobile Two-way Radio	Minimum Distance from Transmitting Antenna
7 to 15 watts	1 foot (30.5 centimeters)
16 to 50 watts	2 feet (61 centimeters)
More than 50 watts	3 feet (91.5 centimeters)

Antenna Installation

Mobile Antennas

Recommended mobile antenna installations are limited to metal body vehicles at the center of the roof and center of the trunk deck locations.

The antenna installation must additionally be in accordance with:

- The requirements of the antenna manufacturer/supplier.
- Instructions in the Radio Installation Manual.

Fixed Site Antennas

Mobile radio equipment is sometimes installed at a fixed location and operated as a control station or as a fixed unit. In such cases the antenna installation must comply with the following requirements in order to assure optimal performance and make sure human exposure to radio frequency electromagnetic energy is within the guidelines set forth in the above standards:

- The antenna must be mounted outside the building.
- Mount the antenna on a tower if at all possible.

- If the antenna is to be mounted on a building then it must be mounted on the roof.
- As with all fixed site antenna installations, it is the responsibility of the licensee to manage the site in accordance with applicable regulatory requirements and may require additional compliance actions such as site survey measurements, signage, and site access restrictions in order to insure that exposure limits are not exceeded.

Introducing the MW-520

The Mobile Workstation 520™ combines the power of a desktop computer with the flexibility required in a mobile environment. Its powerful processor can handle applications with local databases and detailed graphical images, including fingerprints, mugshots, and maps.

The integrated radio-modem provides access to your data system without the need for a separate, external radio-modem.

The workstation can be easily mounted even in dual airbag-equipped vehicles, to permit safe and comfortable user operation. The backlit display controls and uplit keyboard provide increased visibility and the removable keyboard offers improved usability.

Hardware Features

The MW-520 consists of three separate interconnected components: processor, display unit, and keyboard. Standard hardware features include:

Feature	Description
Processor	• An Intel® Pentium® III 500 Mhz processor. • VGA controller with 2 MB internal video RAM, operating with the LCD. • Power management complying to APM 2.1 or ACPI specs and Windows® compatible. Supports standard power management modes, such as suspend and resume.
Memory	• 64 MB of internal memory, expandable to 128 MB or 256 MB. • 6 GB fixed hard disk. • External memory is also available through two Type II PC Card slots, with support for Type II or Type III cards.

Feature	Description
Peripherals	• One standard serial COM port and one parallel port to which you can connect optional system components such as: modem, printer, etc. • One standard USB port to which you can connect off-the-shelf USB devices (for example, a USB floppy). • One IDB port (up to 0.5 Mhz), which is intended for in-vehicle use. The IDB port is implemented as an IDB-C, which means that the physical layer implementation incorporates devices supporting CAN 2.0B. Not currently available.
Modem	• A compact, internal radio modem provides automatic data communication links to central dispatching and other mobile workstations.
Display	• VGA option: 10.4”, 640 x 480, VGA color, 350 nit or high brightness, active matrix LCD. • SVGA option: 10.4”, 600 x 800, SVGA color, high brightness, active matrix LCD. • Screen brightness is manually adjustable. • Standard or enhanced reflection touchscreen.
Video In	• One standard composite video input (CVBS) port to which you can connect composite video source - PAL or NTSC.
Sound	• Internal speaker - 0.5W • External speaker - 5W • Volume is adjustable from the display unit.
GPIO	• Three general purpose I/O lines which allow monitoring and/or control of external devices. These lines are TTL level signals - 5V for logic high, 0V for logic low.
Keyboard	• 84-key QWERTY keyboard with 12 dedicated function keys. • Numeric keypad operations are available through special key combinations. • Includes the GlidePoint® high performance pointing device. • Keyboard illumination is provided.

Software Features

The MW-520 operations are controlled by system board firmware (programs permanently stored in ROM), an operating system, and device drivers. The software is already installed in your system. Software features include:

- Microsoft Windows® 98/2000/Me.
- Flash ROM that enables you to update the BIOS from a PC Card.
- USB boot using USB floppy device.
- PC Card boot.

Power Features

- 12V external vehicle battery.
- Backup battery that maintains the system configuration and time.
- Ignition-sensitivity.

Power Management Features

- Idle mode: Lower the CPU speed to reduce power consumption.
- Suspend mode: Shut down system components to reduce power consumption.

Processor Overview

The following figures show a front and rear view of the processor unit:

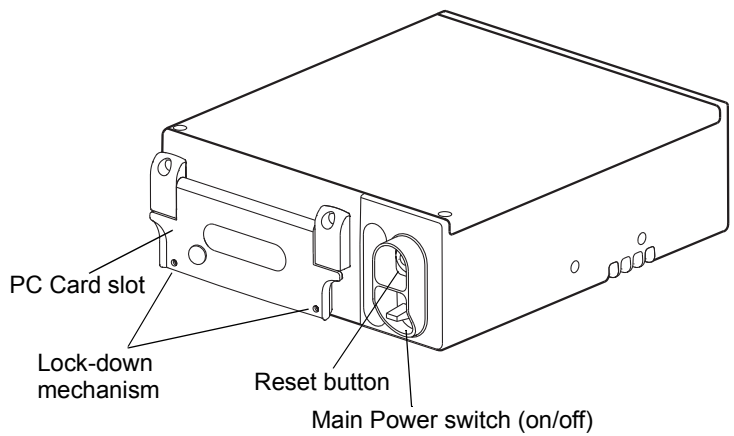


Figure 1
Processor - Front View

The main power switch, the reset button and the PC Card slot are located on the front panel of the processor.

Main Power Switch	Connects/disconnects the terminal power supply from the vehicle's battery. To save battery power, when you leave the vehicle unattended for more than 12 hours, turn off the main power switch.
Reset Button	Generates a hardware reset.
PC Card Slot	The MW-520 features a slot for installing two PC Card Type II cards or one PC Card Type III card. A cover protects the PC Card slot against severe environmental conditions. For detailed information on the slot and how to insert and remove PC Cards, see "Using PC Cards", on page 50.
Lock-down Mechanism	For security purposes, the door can be locked with two screws. The screws are provided together with an Allen key.

Caution

Turning off the Main Power Switch, or pressing the Reset button when the MW-520 is running under Windows 98/ 2000/Me may seriously damage your operating system or your hard disk.

The rear panel of the processor shows the following connectors:

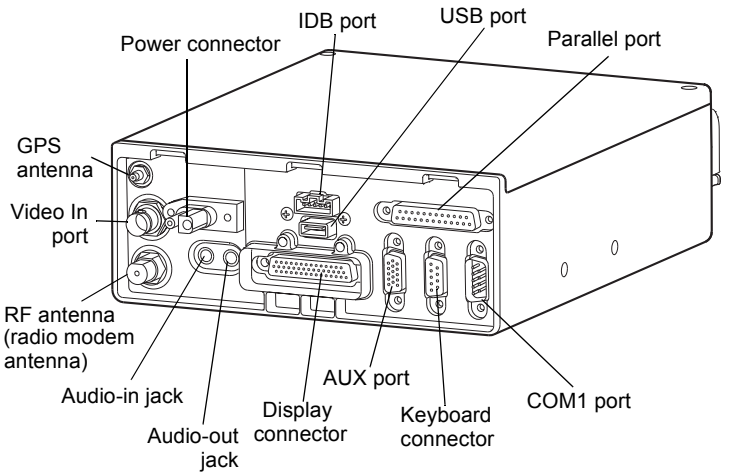


Figure 2
Processor - Rear View

Connector	Description
Parallel port	DB-25 female connector for printer. Plugging in a parallel printer requires the cable to be IEEE 1284 Standard compliant.
Power connector	DC connector for vehicle. Requires a standard Motorola power cable (FKN4567) with fuse.
RF antenna	Mini-UHF radio modem antenna connector.
Audio-in jack	Microphone jack: one microphone jack that allows you to attach an external microphone so you can record sound. The SMN4095 microphone and FKN4914 adapter are approved for the MW-520.
Audio-out jack	Speaker jack: one speaker jack that allows you to attach an 8 Ohms, 5W speaker, in parallel to the internal speaker.
Display connector	DB-44 female connector for the display unit. Requires the Motorola cable part no: 3002132C45 (4 feet).
Keyboard connector	DB-9 female keyboard connector for connection of the keyboard.
COM1 port	DB-9 RS-232 male connector. Requires an off-the-shelf cable, depending on the selected accessory (Motorola's VRM 650, printer).
AUX port	DB-9 female connector. Allows you to attach an external VGA monitor. Requires a specific adapter and is limited to certain VGA monitors approved by Motorola. Also includes three GPIO lines at TTL Levels.
Video In port	BNC type connector, 75Ω for connection to external video sources. A BNC to RCA adapter 5802810C07 is also available.
GPS antenna	GPS antenna connector. Antenna is supplied with optional built-in GPS receiver.
IDB port	6-pin connector for interfacing to the IDB in-vehicle bus. Not currently available.
USB port	Type A receptacle connector for connection of a USB device.

Display Unit Overview

Color Display (Option V311)

The following figure shows the front view of the color display unit:

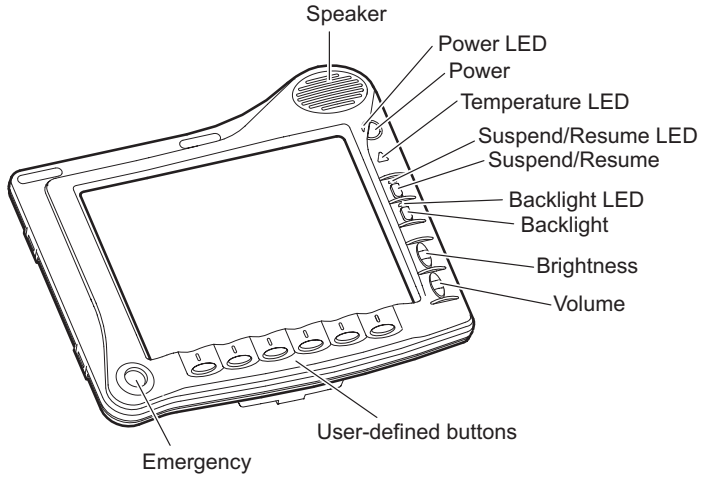


Figure 3
Color Display Unit

Note

The color LCD does not support CGA modes 0,1,4,5 and 13. If any application compels the LCD into one of these modes, the screen will turn white.

Touchscreen (Options V672AA and V693AA)

These options are easy to use, rugged and speedy. The resistive touchscreen is sealed against moisture and dirt and can be operated with gloved hands. For detailed information on the touchscreen calibration, see "Calibrating the Touchscreen", on page 53.

Note

A screen saver should be used.

Caution

Do not display a single image on screen for an extended period of time.

Buttons

The display unit comprises the following buttons:

Button	Press...
Power	To turn the MW-520 on or off.
Suspend/ Resume	To toggle the MW-520 between Suspend and Resume modes. When in Suspend mode, the display and computer sections are turned off. The workstation enters a power saving mode while keeping the radio powered on. When the MW-520 resumes, it returns to the state it was prior to suspend (previous display, LED indications, etc.).
Backlight	To toggle between backlight on and off. Set the desired backlight brightness, using the Brightness button.
Brightness	The upper arrow to increase or the lower arrow to decrease the on-screen light level. In the VGA option there are 32 continuous linear brightness levels. In the SVGA option there are 32 logarithmic brightness levels. You can control the brightness only if the backlight is turned on (Backlight LED is off).
Volume	The upper arrow to increase or the lower arrow to decrease the speaker's volume level.
User-defined	To carry out specific functions, depending on specific user application.
Emergency	To send an emergency message to the RF host computer. (This key's functionality depends on its definition in each user system and the active application.)

Indicators

The indicator LEDs located on the display unit show the MW-520 status, as described in the following table:

LED	Description	
Power (green)	On: Blinking: Off:	System is on. The vehicle battery is discharged. System is off, or the terminal is in Suspend mode.
Temperature (red)	Blinking: Off:	Processor or display unit temperature is out of range. For more information, refer to "Powering On in Extreme Temperature Conditions", on page 22. Normal operation.
Suspend/ Resume (green)	On: Off:	System is in Suspend mode. Normal operation.
Backlight (green)	On: Blinking: Off:	LCD backlight is off. Ignore this information. LCD backlight is on.

Speaker

The speaker is used for user audio alert signaling. Adjust the speaker volume with the Volume button. To set the audio level, open the speaker volume bar by pressing the speaker icon on the lower Tool Bar. The volume bar appears on the screen.

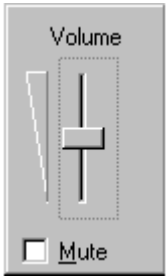


Figure 4
Volume Bar

The new volume setting is saved in the memory.

High Brightness Color Display Option

Hardware Features

Standard hardware features include:

- 10.4", 800 × 600, SVGA color, active matrix LCD.
- Options V672AA (standard touchscreen) and V693AA (enhanced reflection touchscreen).
- Brightness is manually adjustable, sunlight visible at high level and dim night light at low level.
- Display backlight is automatically turned off during power cranking.
- Smart thermal management in extreme high temperatures.
- A backlight heater for low temperatures.
- V672AA is a standard touchscreen with ˜75% light transmittance.
- V693AA is an enhanced reflection touchscreen which provides better contrast with ˜50% light transmittance.

Overview

The rear panel of the high brightness color display shows the following connectors:

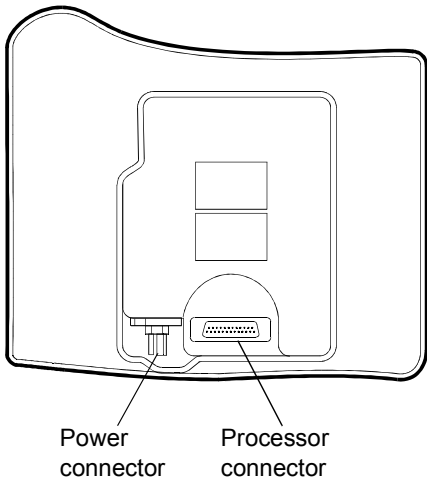


Figure 5
High Brightness Color Display - Rear View

Connector	Description
Power Connector	DC connector for vehicle Requires a standard Motorola power cable (FKN4567) with fuse.
Processor Connector	DB-44 male connector for the processor unit. Requires the Motorola cable part no: 3002132C45 (4 feet) or 3002132C58 (10 feet).

Operating the MW-520 for the First Time

Powering On

VGA Option

Note

The Main power switch on the processor's front panel must be ON when the system is connected to a power supply.

Press the Power button on the upper right corner of the MW-520 display to power it on. Upon power up, all display buttons and LEDs are lit for a period of 1 second. The power status LED remains lit, meaning that the system is on.

If the MW-520 is *ignition-sensitive*, insert the car key into the ignition switch and rotate it to ACC position, or start the engine, before powering on.

SVGA Option

Before flipping up the MW-520 main power switch:

- Check that the two power cables are plugged into the DC connectors of the processor and display.
- Verify that the display cable is connected on both sides.
- Verify that the main power supply can supply at least 8A.

Understanding POST

When you turn the MW-520 on, a routine called Power-On Self Test (POST) automatically runs to test the computer components.

Error messages appear if the POST test fails. There are two kinds of messages:

- Beep codes identify specific problems that can occur within the MW-520. After POST successfully completes, you hear one system beep. If you hear more than one system beep during start-up, make a note of the number of beeps you hear in each set of beeps. Then report the information to your dealer/distributor or technical support representative.

- Screen messages are built into the workstation to report both normal and abnormal system conditions. Each message is preceded by a two-digit number.

  If an error message appears, take any action suggested in the message. If the message identifies the error condition but suggests no corrective action, write down the number preceding the message and contact your dealer/distributor for assistance.

Operating System

The MW-520 supports Windows 98/2000/Me. However, only one operating system is installed.

Adjusting the LCD Display

The MW-520 incorporates a transmissive color Thin Film Transistor (TFT). The screen provides the best possible readability in the lighting conditions typically found in the vehicle environment.

The MW-520 is shipped with color palette settings that have been optimized for operation in the vehicle. The appearance of the screen can be changed as described below.

The brightness of the display is affected by the settings of the brightness control of the color palette.

Adjustment of the color palette in Windows 98/2000/Me can be made in the Control Panel under the Appearance tab of the "Display" section. Best results are obtained using the "Windows Standard" scheme.

Powering On in Extreme Temperature Conditions

VGA Option

The MW-520 operating temperature range is -20°C - +50°C.

To enable the full operating temperature range, the BIOS setup *Idle Mode* parameter must be set to its default value.

When powering on *below* the operating temperature range, the temperature LED blinks. The workstation will automatically power up once the operating temperature range is reached (the internal heater will raise the MW-520 temperature to within its operating range). You may also turn the workstation off and try again at a later stage.

In extreme temperatures above 50°C, the workstation will not power up.

SVGA Option

If the ambient temperature is in the +50°C - +75°C range, the temperature LED will blink and the MW-520 will power up, but the display brightness level will be approximately one third of the maximum level. If the temperature drops to the operating range the display brightness will be restored.

If the ambient temperature is in the -20°C - 0°C range, the temperature LED will blink and the backlight heater will start operating. When the CCFL (Cold Cathode Fluorescent Lamps) temperature reaches 0°C (after approximately 2 minutes) the MW-520 will automatically turn on.

If the ambient temperature is in the 0°C - +20°C range, the backlight heater will operate and the MW-520 will turn on at once. The heater turns off when the CCFL temperature reaches 50°C.

Operating the MW-520 in Extreme Temperature Conditions

VGA Option

If, during normal operation, the ambient temperature deviates from the normal operating range, the temperature LED will blink. When the temperature returns to within the operating temperature range, the LED will be turned off.

A special temperature management mechanism prevents the MW-520 from reaching extreme hot or cold temperatures. This is achieved using a clock throttling technique and an internal heater.

SVGA Option

If during normal operation, the ambient temperature is higher than the normal operating range the temperature LED will blink, the display brightness level will be approximately one third of the maximum level, and a warning message will be displayed on the screen. When the LCD temperature sensor approaches +75°C, the MW-520 will automatically power off after 3 minutes.

If the ambient temperature drops to the normal operating range, the display brightness will be automatically restored.

Powering On with a Discharged Vehicle Battery

The MW-520 will power on normally when the vehicle battery voltage is at least 10.3V.

In the 9.4 - 10.3V range, the power status LED will blink and the workstation will not power up.

Below 9.4V, all LEDs and buttons will light up for a period of 1 second and the MW-520 will not power up.

Operating the MW-520 with a Discharged Vehicle Battery

VGA Option

If, during normal operation, the vehicle battery voltage drops to 10.2V, the power status LED will blink and a warning message will be displayed on the screen. If the voltage continues to drop, the MW-520 will automatically power off at 8.5V.

SVGA Option

During power cranking, the display backlight is automatically turned off at 8V to save power. The backlight will be restored once the vehicle battery voltage is a stable 10.4V for at least 4 seconds.

Restarting the MW-520

Restarting the MW-520 when it is running under Windows 98/2000/Me may damage your operating system or your hard disk.

You can restart (reboot) the MW-520 by:

- Pressing <Ctrl+Alt+Del>. This is a warm (or soft) boot.
- Pressing the Reset button on the processor's front panel. This is a cold (or hard) boot.

As the system starts, it conducts tests of its components, known as POST.

When you restart the system, you lose any data you have not saved to a hard disk drive, or PC Card.

Powering Off

To turn the MW-520 off, press the Power button on the display. The system will not immediately power off, since a certain amount of time is needed for the Windows application to shut down.

Save important information before turning off the MW-520.

The MW-520 automatically turns off as a result of:

- Extreme temperatures.
- Discharged vehicle battery.
- Pressing the Power button on the display for more than four seconds.

In critical conditions, the workstation may be powered off by turning off the Power switch on the processor's front panel.

Turning off the Main Power switch or disconnecting the power cable when the MW-520 is running under Windows 98/2000/Me may seriously damage your operating system or your hard disk.

If the MW-520 is *ignition-sensitive*, it turns off automatically when the engine is switched off. However, a warning is issued before powering off, so you can return the car key to ACC position and resume working, if required.

Using the Keyboard

The MW-520 has a QWERTY 84-key keyboard. By pressing designated keys, you can have access to all of the key functions of a full size keyboard.

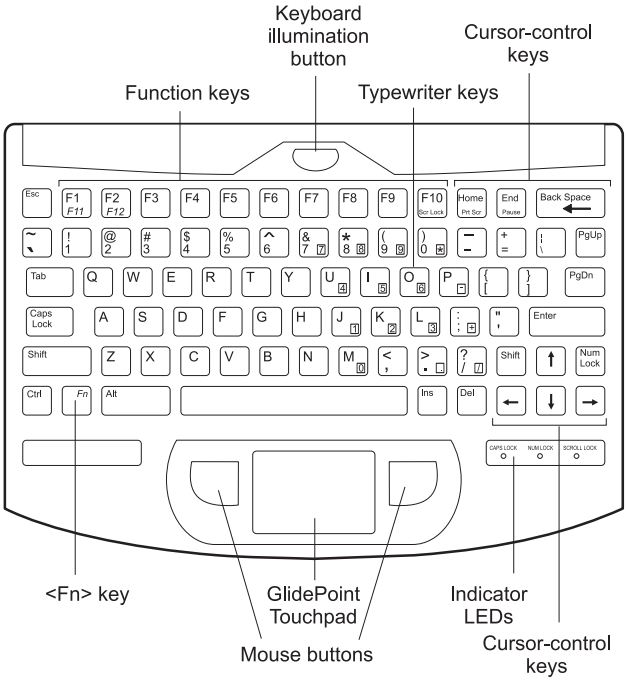


Figure 6
MW-520 Keyboard

The keys on the keyboard can be grouped into the following categories:

- Typewriter keys are arranged like a standard typewriter keyboard and are used for standard text entry.
- Function keys can be programmed to perform complex operations. Many programs have predefined operations mapped to function keys.
- Cursor control keys move the cursor. They may take on other functions, depending on your software.

Indicator LEDs

The indicator LEDs display the status of the MW-520 functions, as listed below:

Light	Description
Caps Lock	On: <Caps Lock> key is activated.
Num Lock	On: <Num Lock> key is activated.
Scroll Lock	On: <Scroll Lock> key is activated.

Lighting the Keyboard

To turn on the keyboard illumination, press the Keyboard illumination button.

Using the Numeric Keypad

The keyboard includes a numeric keypad, meaning a group of keys that you can set to type numbers. The <Num Lock> key activates these functions.

The boxed number in the lower right corner of each key indicates its numeric function.

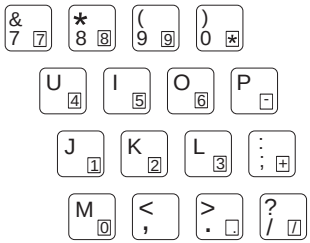


Figure 7
Numeric Keypad

The following table shows how you activate the numeric keypad and the various functions, such as arrow functions, PgUp, PgDn, etc.

Note

For your convenience, use the numerals and functions located on the typewriter keys. Use the numeric pad only when the specified scan code is required.

Press	To activate...
Num Lock	15 boxed numbers and symbols Cursor control functions: • arrows, PgUp, PgDn, Home, End, Ins, Del • Print Screen, Scroll Lock, Pause
<Fn>	Function keys: • F11 and F12

Using the GlidePoint® Touchpad

The keyboard includes the GlidePoint touchpad, which is a high performance pointing device that is used with the left and right mouse buttons beneath the keyboard to perform standard mouse functions.

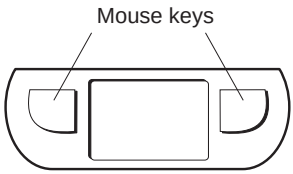


Figure 8
GlidePoint Touchpad

To use the touchpad:

- Place your finger on the pad and move your finger in the direction you want the cursor to move. The faster you move your finger, the faster the cursor moves across the screen.
- Roll your finger from side to side to move the cursor short distances.
- Quickly tap your finger on the touchpad to click on an item.
- Tap your finger twice to double-click on an item.
- Tap and hold to drag, draw, and highlight.
- Tap your finger on the upper right corner of the touchpad to operate the right mouse button.

You can also use the buttons on each side of the touchpad in the same way you use standard mouse buttons.

To clean the touchpad, use a soft cloth dampened with ethyl or rubbing (isopropyl) alcohol. Wipe the surface gently.

Connecting Peripheral Devices

Caution

Turn off the MW-520 before you connect a peripheral device. Connecting a peripheral device with the workstation powered on may seriously damage the workstation.

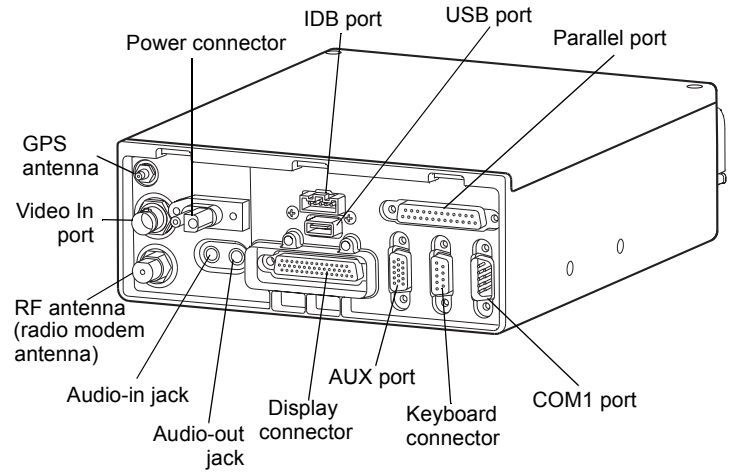


Figure 9
Peripheral Ports

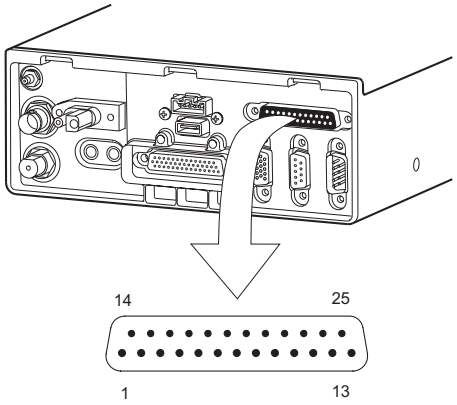
You can attach peripheral devices to these connectors:

- Parallel port: Plug a parallel device, such as a parallel printer, into this 25-pin port.
- Serial port: Plug a serial device, such as a serial printer, into this 9-pin port. If the device has a 25-pin connector, you need a 25-to-9 pin serial adapter.
- Audio connectors:
  - Connect an external microphone to the microphone jack.
  - Connect an external 5 Watts speaker.
- Auxiliary port: Plug the interface cable of an external monitor into this 15-pin connector and then plug the monitor power cord into a grounded outlet.
- USB port: Plug a USB device, such as a USB floppy, into this port.
- IDB port: Connects to the in-vehicle bus.
- Video In port: Plug an external video source into this port.

Connecting a Peripheral Device to the Parallel Port

The MW-520 has one built-in parallel port. The port uses a 25-pin female connector. The default configuration for the port is LPT1 with the addresses 3BCh through 3BEh and IRQ7.

You can use an off-the-shelf parallel printer cable (IEEE 1284 Standard compliant) to connect the MW-520 to the printer. The following table shows the parallel port pinouts:



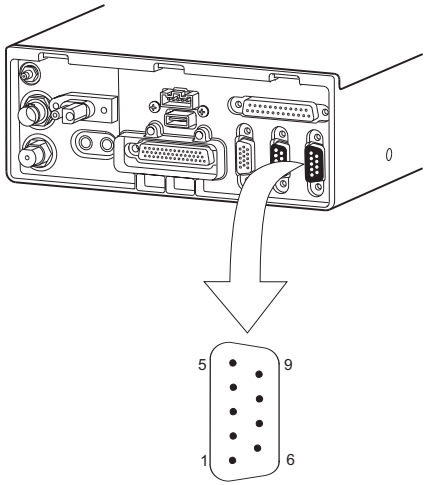
Pin	Signal
1	PSTB#
2	PD0
3	PD1
4	PD2
5	PD3
6	PD4
7	PD5
8	PD6
9	PD7
10	PACK#
11	PBUSY
12	PEP
13	PSLCT
14	PAFD#
15	PERR#_PRL
16	PINIT#
17	PSIN#
18-23	GND
24	PNF_SIRQI3
25	NC

Figure 10
Parallel Port Pinouts

Connecting a Peripheral Device to the Serial Port

The serial connector is a DB-9 male connector that conforms to the EIA RS-232C communication standard and is configured as a DTE device. By default, it is enabled through System Setup and configured as COM1 with the addresses 3F8h through 3FFh and IRQ 4.

The 9-pin serial port is completely AT-compatible. Because many peripheral devices use 25-pin (DB-25) connectors, you may need to use a DB9-to-DB25 adapter cable between the 9-pin serial port and the peripheral device.

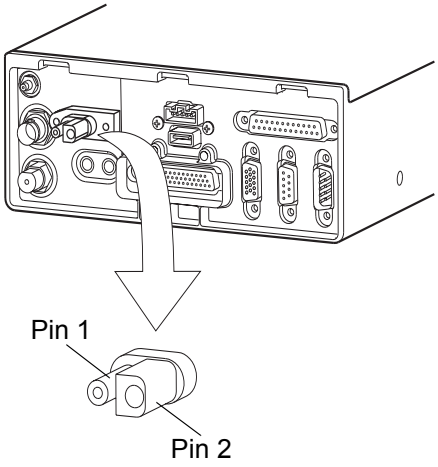


Pin	Signal
1	DCD
2	Rx
3	Tx
4	DTR#
5	GND
6	DSR#
7	RTS#
8	CTS#
9	RI#

Figure 11
Serial Port (COM1) Pinouts

Power Connector

The MW-520 power connector is used by the DC connector for the vehicle.

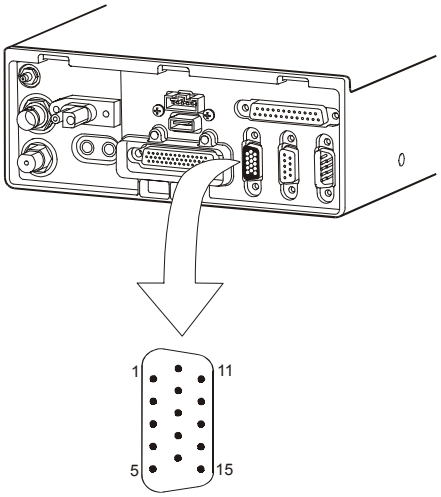


Pin	Signal
1	PVBAT
2	NVBAT

Figure 12
Power Connector Pinouts

AUX Connector

The AUX connector is used for an external VGA monitor, for connecting the ignition-sense wire, and for GPIOs. It is a 15-pin female connector.



Pin	Signal
1	RED
2	GREEN
3	BLUE
4	GPIO1
5	GPIO2
6	AGND
7	AGND
8	AGND
9	IGN_HIGH
10	DGND
11	DGND
12	IGN_HIGH/GPIO3
13	HSYNC
14	VSYNC
15	IGN_LOW

Figure 13
AUX Port Pinouts

Connecting a Monitor

After connecting the monitor, the display is switched automatically between the LCD panel and the external monitor.

Connecting the Ignition-Sense Wire

For a detailed description of the ignition-sense wire connection, see the *Mobile Workstation 520™, Vehicle Installation Manual,* publication no. 68P02962C15-O.

Using the GPIO

Pins 4 and 5 are GPIO lines. The default position of pin 12 is GPIO3. These lines are TTL level and can be used either as a control or as status lines.

Configuring the MW-520

The System Setup program enables you to configure the MW-520 hardware. The settings you choose are stored in battery-maintained memory that saves the information, even when the power is turned off. When the MW-520 is turned back on, it is configured with the values found in this memory.

Run System Setup if you get a message prompting you to run the program. You may also want to run System Setup, particularly the first time you use the MW-520, to set the time and date, use security or power-management features, or alter the settings of other features.

This section describes the System Setup menus, fields, and options. Note that:

- Not all versions of System Setup contain all the fields listed here.
- Field names and order of appearance may vary according to version.
- The bold and italicized options are the defaults.

Warning

Incorrect settings can cause your system to malfunction.

Main Menu

To start the MW-520 Setup Utility:

1. Turn on or reboot the MW-520.
2. Press <F2> to display the Main menu.

Menu Bar

The Menu Bar at the top of the window lists these selections:

Main	Use this menu for basic system configuration.
Advanced	Use this menu to set the Advanced Features available on your system's chipset.
Security	Use this menu to set User and Supervisor Passwords.
Power	Use this menu to configure Power Management features.
Boot	Use this menu to set booting options.
Exit	Use this menu to exit the current menu.

Use the left/right "← →" arrow keys to make a selection.

See "Exit Menu", on page 45, for a description on exiting the Main menu.

Legend Bar

Use the keys listed in the legend bar on the bottom of the window to make your selections or exit the current menu. The following chart describes the legend keys and their alternates:

Key	Function
<F1>	General Help window.
<Esc>	Exit this menu.
← or → arrow keys	Select a different menu.
↑ or ↓ arrow keys	Move cursor up or down.
<Tab> or <Shift-Tab>	Cycle cursor up or down.
<Home> or <End>	Move cursor to top or bottom of window.
<PgUp> or <PgDn>	Move cursor to next or previous page.
<F5> or <->	Select the previous value for the field.

Key	Function
<F6> or <+> or <Space>	Select the next value for the field.
<F9>	Load the default configuration values for this menu.
<F10>	Load the previous configuration values for this menu.
<Enter>	Execute command or select sub menu.

To select an item, use the arrow keys to move the cursor to the field you want. Then use the plus-and-minus value keys to select a value for that field. The Save Values commands in the Exit menu save the values currently displayed in all the menus.

To display a sub menu, use the arrow keys to move the cursor to the sub menu you want. Then press <Enter>.

A "„" pointer marks all sub menus.

Field Help Window

The Help window on the right side of each menu displays the help text for the currently selected field. As you move the cursor to each field, it updates the displayed information.

General Help Window

Pressing <F1> or <Alt-H> on any menu brings up the General Help window that describes the legend keys and their alternates.

The scroll bar on the right of any window indicates that there is more than one page of information in the window. Use <PgUp> and <PgDn> to display all the pages. Pressing <Home> and <End> displays the first and last pages. Pressing <Enter> displays each page and then exits the window.

Press <Esc> to exit the current window.

Main Menu Selections

You can make the following selections on the Main menu itself. Use the sub menus for other selections.

Feature	Options	Description
System Time	HH:MM:SS	Set the system time.
System Date	MM/DD/YYYY	Set the system date.
System Memory	N/A	Displays amount of conventional memory detected during bootup.
Extended Memory	N/A	Displays amount of extended memory detected during bootup.

Fixed Disk

The Primary IDE adapter controls the hard disk drives installed in the MW-520. The Primary Master device is always connected, and the Primary Slave device is not in use. The Default BIOS setting is [Auto], which means that the BIOS recognizes the hard disk drive automatically. It is recommended to use this setting when working with hard disk drives. When using this setting, the size of the hard disk drive appears on the Main menu.

Cautions

1. Before attempting to configure a hard drive, make sure you have the configuration information supplied by the manufacturer of your hard drive. Incorrect settings can cause the MW-520 to malfunction.
2. The maximum shelf life for the hard disk is one year. After this period, the MW-520 may malfunction and there is a possibility of disk degradation.

Feature	Options	Description
Auto Fixed Disk	N/A	Pressing <Enter> at this field attempts to read the hard disk parameters from the drive itself and sets the following options to their optimum settings. Sets Type field to "User" and allows editing of other fields.

Feature	Options	Description
Type	1 to 39 User ***Auto*** CD None	1 to 39 fills in all remaining fields with values for predefined disk types. “User” prompts the user to fill in remaining fields. Manually enter the number of cylinders, heads and sectors per track. “Auto” autotypes at each boot, displays settings in the Setup menu and does not allow editing of remaining fields.
Cylinders	1 to 16,384	Number of cylinders.
Heads	1 to 16	Number of read/write heads.
Sectors	1 to 63	Number of sectors per track.
Write Precomp	N/A	Obsolete.
Multi-Sector Transfer	Auto 2 sectors 4 sectors 8 sectors 16 sectors	Auto sets the number of sectors per block at the highest number supported by the drive. This is not always the fastest option.
LBA Mode Control	Enabled ***Disabled***	Enables Logical Block Access.
32-Bit I/O	Enabled Disabled	Enables 32-bit communication between CPU and IDE card. Requires PCI or local bus.
Transfer Mode	Standard Fast PIO1 Fast PIO2 Fast PIO3 or Standard Fast DMA A Fast DMA A Fast DMA A	Selects the method for transferring the data between the hard disk and the system memory. The Setup menu only lists those options supported by the drive and platform.
Ultra DMA Mode	Disabled Mode 0 Mode 1 Mode 2	Selects the Ultra DMA mode used for moving data to/from the drive.

Keyboard Features

Defines the keyboard presetting to be implemented during system boot.

Feature	Options	Description
Num Lock	***Off*** On	Selects power-on state for Num Lock.
Keyboard Auto Repeat Rate	2/sec 6/sec 10/sec 13.3/sec 18.5/sec 21.8/sec 26.7/sec ***30/sec***	Selects key repeat rate (ch/sec).
Keyboard Auto Repeat Delay	¼ sec ***½ sec*** ¾ sec 1 sec	Selects delay before key repeat.

Memory Cache

Enabling cache saves time for the CPU by holding the data most recently accessed in regular memory (dynamic RAM or DRAM) in a special storage area of static RAM (SRAM), which is faster. Before accessing regular memory, the CPU first accesses the cache. If it does not find the data it is looking for there, it accesses regular memory.

The actual features displayed on the Memory Cache menu depend on your system's hardware.

Use the legend keys listed on the bottom of the window to make your selections and exit to the Main menu.

Use the following chart to configure the memory cache:

Feature	Options	Description
Cache	Disabled ***Enabled***	Selects the state of the memory cache.

Advanced Menu

Selecting “Advanced” from the menu bar on the Main menu displays the Advanced menu.

Use the legend keys listed on the bottom of the window to make your selections and exit to the Main menu.

Use the following chart to make your selections:

Feature	Options	Description
Local Bus IDE Adapter	***Enabled*** Disabled	Enables the interpreted Local Bus IDE adapter.
Installed OS	***Win 98/2000/Me*** Other	Selects the operating system installed on your system that will be used most commonly.
Large Disk Access Mode	DOS ***Other***	Select DOS if you have DOS. Select Other if you have UNIX, Novell Netware or another operating system. A large disk is one that has more than 1024 cylinders, more than 16 heads, or more than 63 tracks per sector.
Reset Configuration Data	Yes ***No***	Select Yes to clear the system configuration data.
Secured Setup Configurations	Yes ***No***	Select Yes to prevent a Plug and Play operating system from changing system settings.

I/O Device Configuration Menu

Most chipsets manage the connections between the CPU and the I/O ports (COM: and LPT1:), the floppy disks, and the hard drive controllers. Some systems have a separate on-board chip for handling these items. If your system has a separate on-board I/O chip, selecting “I/O Device Configurations” on the Advanced menu displays the I/O Device Configurations menu.

Use the legend keys listed on the bottom of the window to make your selections and exit to the Main menu.

Use the following chart to configure the chipset:

Feature	Options	Description
COM ports		Select a unique address and interrupt request for the listed COM ports. Auto selects the next available combination.
Serial Port A	***Enabled*** Disabled Auto	
Serial Port B	***Enabled*** Disabled Auto	
Parallel Port	***Enabled*** Disabled Auto	
Base I/O Address	***378, IRQ 7***	Set the base I/O address for the Serial ports.
Parallel Port Mode	***ECP*** Bi-Directional Output Only EPP	
Serial Port C	***Enabled*** Disabled	
Serial Port D	***Enabled*** Disabled	

Security Menu

Selecting “Security” from the menu bar displays the Security menu. Use this menu to configure the system security.

Use the legend keys listed on the bottom of the window to make your selections and exit to the Main menu.

Enabling “Supervisor Password” requires a password for entering Setup. The passwords are not case sensitive. Pressing <Enter> at either “Set Supervisor Password” or “Set User Password” displays a dialog box like this:

```
Set Password
Enter new password: [ ]
Re-enter new password: [ ]
```

Use the following chart to make your selections:

Feature	Options	Description
Supervisor Password	***Disabled*** Enabled	Disables/enables the supervisor password.
Set User Password	***Disabled*** Enabled	Disables/enables the user password.
Supervisor Password	Up to seven alphanumeric characters	A dialog box for entering the supervisor password is displayed. This password gives full access to Setup menus.
Set User Password	Up to seven alphanumeric characters	A dialog box for entering the user password is displayed. This password gives restricted access to Setup menus. Requires prior setting of the Supervisor password.
Password on boot	***Disabled*** Enabled	Enabled requires a password on boot. Requires prior setting of the Supervisor password. If the Supervisor password is set and this option is disabled, BIOS assumes user is booting.

Power Menu

Selecting "Power" from the menu bar displays the Power menu.

Use this menu to specify your settings for Power Management. Remember that the options available depend on the hardware installed in your system. Those shown below are from a typical system.

A power management system reduces the amount of energy used after specified periods of inactivity. The Setup menu pictured here supports a Full On state, an Idle and Standby state with partial power reduction, and a Suspend state with full power reduction.

Use the legend keys listed on the bottom of the window to make your selections and exit to the Main menu.

Use the following chart to make your selections:

Feature	Options	Description
Power Savings	Disabled ***Customized***	Select Customized to make your own selections from the following fields. Disabled turns off all power management.
Idle Mode	Off ***8 sec*** 12,20,32,40, 60 sec	Turns on/off CPU Idle mode.
Auto Suspend Timeout	Disabled ***10 min*** 5,15,20,30,40, 60 min	Inactivity period required after Standby to Suspend (maximum power shutdown).
Suspend Mode	***Suspend*** Save to disk	Select the type of Suspend mode.
Suspend Button	Disabled Enabled	When disabled, the system cannot be suspended using the button on the display.
Hard Disk Timeout	Disabled ***1 min*** 10,15,30,45 sec 1,2,4,6,8,10, 15 min	Inactivity period of hard disk required before Standby (motor off).

Feature	Options	Description
Resume On Time	***Off*** 1,2,3,4,5,6,7, 8 hours	Amount of time in Suspend state before the machine will resume to full on.

Exit Menu

Selecting “Exit” from the menu bar displays the Exit menu.

The following sections describe each of the options on this menu. Note that <Esc> does not exit this menu. You must select one of the items from the menu or menu bar to exit.

Exit Save Changes

After making your selections on the Setup menus, select “Exit Save Changes”. This procedure stores the selections displayed in the menus in CMOS (short for “battery-backed CMOS RAM”), a special section of memory that stays on after you turn your system off. The next time you boot your computer, the BIOS configures your system according to the Setup selections stored in CMOS.

If you attempt to exit without saving, the program asks if you want to save before exiting. During bootup, PhoenixBIOS® 4.0 attempts to load the values saved in CMOS. If these values cause the system boot to fail, reboot and press <F2> to enter Setup. In Setup, you can get the default values (as described below) or try to change the selections that caused the boot to fail.

Save Changes

Selecting “Save Current Values” saves all the selections without exiting Setup. You can return to the other menus if you want to review and change the selections.

Discard Changes

If, during a Setup session, you change your mind about selections you have made and have not yet saved the values to CMOS, you can restore the values you previously saved to CMOS by selecting “Discard Changes”.

Get Default Values

To display the default values for all the Setup menus, select "Get Default Values" from the Exit menu.

If, during bootup, the BIOS program detects a problem in the integrity of the values stored in CMOS, it automatically restores the default configurations.

Discard Changes and Exit

Select "Discard Changes and Exit" to exit Setup without storing in CMOS any new selections you have made. The previous selections remain in effect.

Using Standby and Suspend

Standby Mode

The *Hard Disk* and *Video Timeout* fields in the System Setup enable you to specify the amount of time the MW-520 can remain idle (no user input or disk activity) before it enters Standby mode. You can disable these options by selecting *OFF*, or you can specify a *Hard Disk* or *Video Timeout* delay time of between 10 seconds and 15 minutes.

In Standby mode, the system and video memory and the video controller slow down. The LCD backlight and hard drive turn off to save energy. DPMS (a form of monitor power management) to an external monitor is invoked.

To resume from Standby mode, you can touch the touchpad or any key on the keyboard.

If you enable both Standby and Suspend modes, the workstation enters Standby mode when the delay time you chose in System Setup has elapsed. The workstation then enters Suspend mode when the delay time you chose in System Setup for Suspend has elapsed.

Suspend Mode

The *Suspend Timeout* field in System Setup enables you to specify the amount of time the MW-520 can remain idle (no user input or drive activity) before it enters Suspend mode. You can disable this option by selecting *OFF*, or you can specify a *Suspend Timeout* delay time of between 1 and 30 minutes.

During Suspend mode, the system saves power by turning off the microprocessor and DMA clocks, video, and all controllable peripheral devices.

Entering Suspend Mode

The MW-520 enters Suspend mode when:

- The Suspend/Resume button is pressed.
- There is no MW-520 activity for a predefined timeout (as defined in the BIOS).

In Suspend mode, the display and computer sections are turned off, and the workstation enters a power saving mode. The Suspend/Resume LED is on.

Resuming from Suspend Mode

The MW-520 resumes from Suspend mode when:

- The Suspend/Resume button is pressed again.
- The Emergency key or any other key is pressed.
- The touchscreen (for upgrade option V311) is operated.
- The workstation receives a radio message.
- The *Suspend Timeout* period, as defined in the BIOS setup, has elapsed.

The MW-520 resumes its previous terminal state (previous display, LED indication, etc.)

The MW-520 automatically resumes and issues a warning if the ambient temperature is outside the operating range limits or the car battery is discharged.

Power Management Control Under Windows® Operating Systems

MW-520 has an Advanced Power Management (APM) system that reduces the amount of energy used after specified periods of inactivity. The APM can also expand the MW-520 temperature range operation.

The APM standard defines two implementation levels:

O/S level - The APM is controlled by the operating system (Windows).

BIOS level - The APM parameters are configured in the System Setup program.

The MW-520 APM may be implemented in one of the following ways:

- The Power Management settings are configured in the System Setup program and the APM is set to *Laptop/Mobile* in Windows 98/2000/Me.
  This configuration is recommended by Motorola and is included as a factory setting. It allows minimal heat dissipation and power consumption, and all MW-520 Windows applications run correctly.
  This configuration also allows full temperature range operation.
- The Power Management settings are configured in the System Setup program and the APM is set to *Standard* in Windows 98/2000/Me.
  This configuration is not recommended since running the MW-520 Windows applications under these conditions may cause data loss or application crashes.
- The Power Management is turned off in the System Setup program and the APM is set to *Desktop* in Windows 98/2000/Me.
  This configuration turns off Power Management entirely and may cause the MW-520 to overheat.

Caution

To enable the full operating temperature range, the BIOS setup *Idle Mode* parameter must be set to its default value.

Note

Full operating temperature range was tested and qualified only with the APM enabled.

Using PC Cards

Two PC Card Type II or one PC Card Type III card slots are available for extended memory and miniature hard disk applications. PC Cards are about the size of a thick credit card and have a 68-pin connector at one end. You may use the PC Card memory cards to boot the terminal externally, update applications, transfer files to other terminals, or store data files.

If you install a Type III card in the bottom slot, you cannot install a card in the top slot.

A beep is sounded when the PC Card is inserted or removed from the slot.

Inserting the PC Card

Do not insert or remove cards when the MW-520 is in system Suspend mode. In addition, before you insert or remove a card, make sure that you exit any software that accesses the card.

There are two types of PC Cards you can use with the MW-520. A Type II card is 5 mm thick, and a Type III card is 10.5 mm thick. You can place a Type II card in either the top or bottom slot. You can place a Type III card only in the bottom slot. When a Type III card goes into the bottom slot, you cannot use the top slot. You may find it useful to get in the habit of always using the bottom slot to make sure the card you are using is properly inserted.

To insert a PC Card into a slot:

1. Open the slot door.
2. Align the card with a slot and insert the card into the slot bottom side up until it locks in place.

Make sure the PC Card is installed bottom side up.

See Figure 13 "Inserting a PC Card", on page 51.

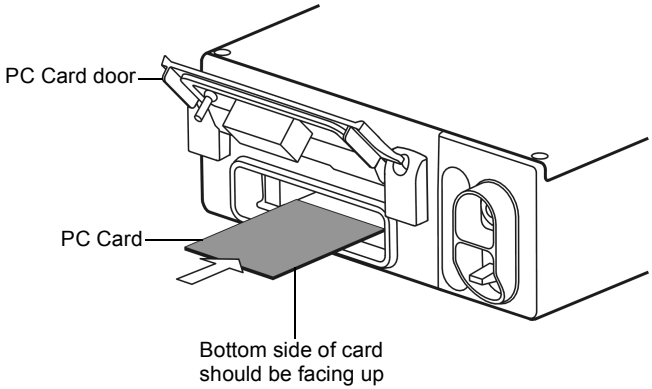


Figure 14
Inserting a PC Card

The eject button for the card slot is even with the card when the card is properly inserted.

Removing the PC Card

To remove a PC Card from the MW-520:

1. Click on the PC Card indicator on the taskbar.
2. Highlight the name of the card you want to remove, and then click the Stop button.
3. When prompted, push the card eject button on the right side of the slot.
4. Pull the card out of the slot compartment.

If you want to use the card again immediately after ejecting it, pull it out about one inch and then push it back in.

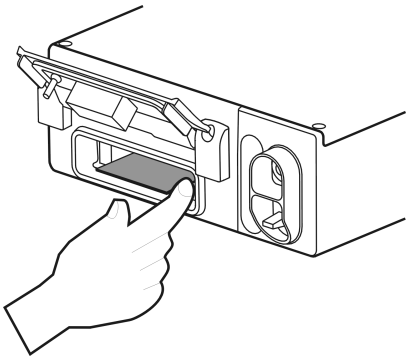


Figure 15
Removing a PC Card

Configuring PC Cards

Windows 98/2000/Me automatically assigns computer resources (such as communication ports and memory addresses) to a PC Card installed in or removed from the MW-520.

For further information on configuring a PC Card:

1. Click on the Start button on the Windows 98/2000/Me taskbar. A popup menu is displayed.
2. Click on *Help*. A sub menu is displayed.
3. Click on the *Index* tab. The *Index Help* window is displayed.
4. Type in field 1:

   `PC Card`

   A list of PC Card topics appears in field 2.
5. Follow the instructions on the screen.

Formatting SRAM Cards

When inserting a new SRAM card into the PC Card slot under Windows 98/2000/Me, the drive is not automatically accessible. To format the SRAM card:

1. Open a MS-DOS prompt and insert the card into its slot.
2. Change directory to `C:\Windows\TFFS9X`.
3. Type `SFORMAT #x`, where x equals 1 for the top slot, and 0 for the bottom slot.
4. Remove the SRAM card from its slot.

The card is now ready for use.

Calibrating the Touchscreen

Options V672AA and V693AA comprise an Elo™ TouchSystems touchscreen. To calibrate the touchscreen, do the following:

1. From the Windows 98/2000/Me *Control Panel*, double-click on the *Elo Touchscreen* icon. The *Touchscreen* dialog box is displayed.
2. Click the *Calibrate* button and follow the instructions on the screen.
3. Click OK to close the dialog box and complete the command.

Note

A click is sounded each time you touch the screen. You can disable this click in the Sounds folder of the Control Panel.

Caution

Please refrain from changing the setup since incorrect settings may damage your system configuration.

Maintenance and Troubleshooting

Cleaning the MW-520

The MW-520 is designed to operate well in typical field conditions. Simple routine maintenance can extend the life of the unit, ensuring continued dependability.

Cleaning the Keyboard

For minor spills, wipe with a damp cloth.

If the keyboard is heavily contaminated or if the keycaps stick as a result of a spill, call a service technician.

- Do not immerse the keyboard in water.
- Do not use solvents or petroleum-based cleaners.

Cleaning the Display

The LCD has a polarized surface and can be damaged easily. To prevent damage:

- Do not touch the screen.
- Do not get liquids on the screen.
- Do not use water, window cleaner, acetone, aromatic solvent or dry, rough towels to clean the screen.

To clean the LCD, use a soft cloth with ethyl or rubbing (isopropyl) alcohol. Wipe the screen lightly.

Turn your equipment off if you accidentally:

- Expose the LCD to liquid.
- Drop, jar or damage the LCD.

Call a service technician if either of these instances occur.

Troubleshooting

If you have difficulty running the MW-520, follow these steps:

1. Consult this section for advice on how to handle operating problems or error messages.
2. If reading this section does not help you resolve the problem, contact Motorola's Technical Support Center.

Operating Problems

This section tells you what to do if you have problems running the MW-520. If any problems persist after you take corrective action, contact your reseller for assistance.

The MW-520 does nothing when you turn it on.
Check that the Main Power switch on the processor's front panel is on, and that the display and power cables are connected. Try turning on the MW-520 again.

If the MW-520 is *ignition-sensitive*, verify that you have inserted the key in the ignition switch and turned it to ACC or that you have started the engine.

The Power button does not shut off the MW-520.
Check your Windows configuration to verify if any application is running. If no application is active, turn the MW-520 off from the Main Power switch.

The MW-520 is not behaving as expected.
Operating the MW-520 at high speed with the cache enabled may cause system instability with some operating systems. If the MW-520 is not behaving as expected and no error messages appear, disable the L2 Memory Cache setting in System Setup.

Nothing appears on the LCD panel when you turn on the MW-520.
Adjust the brightness. Press any key to restore the display.

The Power LED blinks when you turn on the MW-520.
Check that the ambient temperature is within the operating range limits and that the car battery is not discharged.

Some of the letter keys type numbers instead of the indicated letters.
Check if the Num Lock indicator light is on. If so, the numeric keypad on the keyboard is active. To return the keypad to typing letters, press <Num Lock>.

Certain software programs "hang" during operations when there is no interaction with the keyboard or peripheral devices.
Check the Suspend/Resume LED to see if it is on. If so, the MW-520 is in Suspend mode. Press any key to return the workstation to normal operation.

The MW-520 cannot be restarted.
Check if a PC Card with a bootable operating system is in the PC Card slot. If so, remove the card and restart the MW-520.

A serial or parallel device attached to a serial or parallel port on

the rear panel of the system unit does not work properly.
Check the attached device. Is it turned on? Is the cable properly installed between the device and the port? If you are using Windows 98/2000/Me as your operating system, make sure the Plug and Play OS field is set to Yes. If you are using an operating system other than Windows 98/2000/Me, make sure the Plug and Play OS field is set to No.

If you are using DOS, for serial devices, set the serial port to the same baud rate, parity, data-bit, start-bit, and stop-bit parameter values as the attached device. Use the MODE command to set these parameters. Refer to the serial device manufacturer's instructions for the correct parameter values.

A PC Card does not work correctly.
Make sure that the PC Card is inserted bottom side up in the PC Card slot. Check that the card is inserted fully into the slot. If the eject button for the card slot is even with the card, then the card is properly inserted. If you are using a PC Card modem, check the modem cable connections.

The MW-520 sounds the following beeps when turned on in extreme temperature and humidity conditions:

- **one long beep, three short beeps, one long beep, three short beeps**

Press the Reset button.

Tips for Using the MW-520

This information will help you avoid potential problems when you use the MW-520.

- Follow all the instructions and cautions in your MW-520 user documentation.
- Do not disassemble the MW-520. Opening the system chassis voids your warranty.
- Do not remove or install a computer hard drive when the computer is on.
- The MW-520 automatically shuts off when the system temperature rises above 60°C. Do not turn the MW-520 back on until it is cool to the touch.

General Specifications

Processor	Intel® Pentium III®, 500 MHz	
Internal Memory	64 MB RAM expandable to 128 MB and 256 MB	
LCD	VGA	SVGA
Resolution:	640 x 480	800 x 600
Colors:	256,000 colors	256,000 colors
Type:	Active Matrix	Active Matrix
Brightness:		High
Communications/Expansion		
Serial:	One with 16550 UART support	
Parallel:	One with ECP/EPP support	
Video:	Analog VGA	
PC Card Slots:	Two Type II or one Type III	
Mass Storage		
Hard Disk:	6 GB	
Keyboard		
Main:	QWERTY, 84 keys total, 12 function keys, spill-resistant	
Pointing Device:	Integrated touchpad (optional)	
Display Keys:	6 illuminated function keys	
Radio Communications		
Private Data TAC (optional)		
Frequency Range:	806 - 824 MHz Tx, 851 - 869 MHz Rx	
Protocol:	MDC-4800™, RD-LAP 9.6, RD-LAP 19.2 (25 kHz spacing)	
RF Power Output:	3 Watt into 50 Ohm load	
Power Amplifier:	35 Watt, External (optional)	
iDEN OEM		
Frequency Range:	806 - 821 MHz Tx, 851 - 869 MHz Rx	
Protocol:	iDEN (25 kHz spacing)	
RF Power Output:	0.6 watts (variable in 6 steps) into 50 Ohm load	
CDPD OEM		
Frequency Range:	825 - 849 MHz Tx, 870 - 894 MHz Rx	
Protocol:	CDPD (30 kHz spacing)	
RF Power Output:	0.6 watts (variable in 6 steps) into 50 Ohm load	

Physical Size (H×W×D)	
Processor Unit:	2.65" x 7" x 8.5"
Color Display Unit:	10.5" x 12" x 2"
High Brightness Color Display Unit:	10.5" x 12" x 2.3"
Keyboard Unit:	2" x 12" x 8"
Environmental	
Operating Temperature	-20° to +50°C
Storage Temperature	-40° to +70°C
Humidity	90% to 95% non condensing @ 50°C
Vibration	Per MIL STD 810E

Specifications subject to change without notice.

Acronyms and Abbreviations

APM	Advanced Power Management
ATA	AT Attachment
BIOS	Basic Input/Output System
CMOS	Complementary Metal-Oxide Semiconductor
CPU	Central Processing Unit
DMA	Direct Memory Access
DRAM	Dynamic Random Access Memory
DTE	Data Terminal Equipment
ECP	Extended Capabilities Port
EIA	Electronics Industries Association
EPP	Enhanced Parallel Port
FCC	Federal Communications System
GPIO	General Purpose Input Output
IDB	Intelligent Transportation Systems Data Bus
IDE	Integrated Drive Electronics
IRQ	Interrupt ReQuest
ITS	Intelligent Transportation Systems
LCD	Liquid Crystal Display
LED	Light Emitting Diode
MDC	Mobile Data Communications (a Motorola RF protocol)
NTSC	National Television System Committee
PAL	Phase Alternation Line
PC Card	Personal Computer Card
PCI	Peripheral Component Interconnect
PTT	Push-To-Talk
RAM	Random Access Memory
RF	Radio Frequency
ROM	Read Only Memory
Rx	Receive
SDRAM	Synchronous Dynamic Random Access Memory
SRAM	Static Random Access Memory
SVGA	Super Video Graphics Array

TFT	Thin Film Transistor
Tx	Transmit
USB	Universal Serial Bus
VGA	Video Graphics Array
VRM	Vehicular Radio Modem

Glossary

Application	A computer program used to perform a specific task.
BIOS	Software for transferring information between elements, such as memory, screen and disk.
Boot	To start the MW-520. A cold boot resets the MW-520 and runs through all self-tests. A warm boot clears out the MW-520 memory only.
Bus	A communication channel carrying signals from any device used by the system to another device. For example, data being transferred to and from a hard disk travels on a bus.
COM Port	COM stands for communication. COM ports are the serial ports of the MW-520.
CMOS (complementary metal-oxide semiconductor)	The memory that stores the configuration you establish by running the computer's setup program. CMOS memory uses very little power and stores the information even when the computer is turned off.
DB-9	A standard 9-pin connector used for serial interfaces.
DB-15	A standard 15-pin connector for the Auxiliary Unit Interface.
DB-25	A 25-pin connector for V.24 or RS-232 C interfaces.
Device driver	A program that controls how software communicates with a physical device, for example, a mouse, memory, or a printer.
DOS (disk operating system)	Software that supervises the computer's operation, including handling I/O.
Drive	A hierarchical organization of directories, stored on a disk.
Emergency key	An orange key - although it can be any key - that is configured to send emergency information to Dispatch.
FCC	The U.S. federal regulatory agency responsible for the regulation of interstate and international communications by radio, television, wire, satellite and cable.
Hard disk	A large capacity, data storage device that is installed inside the MW-520.
Host	The computer attached to the RNC that communicates with subscriber units.

IDE	A hard drive with a built-in controller.
Operating System	A program that supervises the computer's operation, including handling I/O.
PCI (peripheral component interconnect)	A 32-bit local bus that provides connections for 32-bit add-in boards. The bus operates at an external clock speed of the microprocessor. PCI devices are configured automatically by the system.
PC Card slot	Either of the two sockets on the processor into which the PC Cards are placed.
POST (power-on self test)	A test performed by the MW-520 whenever you turn on the power or press the reset button. POST checks system integrity.
QWERTY format	The standard American keyboard format in which the Q, W, E, R, T and Y keys are the first six alphanumeric keys on the top row of the keyboard.
RAM (random-access memory)	A portion of the system's memory that is designed as a temporary storage area for data and programs. RAM includes conventional and extended memory.
ROM (read-only memory)	Permanent memory dedicated to a particular function.
RF Network	A network of radio receivers, transmitters and amplifiers that routes radio traffic from one point to another.
RS-232 Serial port	The standard COM port on the MW-520.
SRAM	Static RAM. A type of non-volatile RAM that is preserved using an electric current.

Appendix A: Temperature Management

The MW-520 operating temperature range is: -20°C – +50°C. Several mechanisms ensure that no irreparable damage occurs when operating outside of the operating temperature limits.

If the ambient temperature is < -20°C, as shown in range A below, the temperature LED blinks. In range B, the CPU works at its maximum frequency (500 MHz). In ranges C, D and E, the MW-520 software automatically lowers the CPU frequency to the value displayed in the table below.

This ensures that CPU temperature will not reach extreme hot temperatures. At temperatures greater than +60°C, the MW-520 is shut down.

The behavior of the MW-520 at different temperature ranges is shown in the following table:

Range	Ambient Temperature	CPU activity	Temperature LED
A	< -20°C	Operate in Fmax	Blink
B	-20°C - +40°C	Operate in Fmax	Off
C	+40°C - +47.5°C	Operate in 0.5Fmax	Off
D	+47.5°C - +50°C	Operate in 0.25Fmax	Blink
E	+50°C - +60°C	Suspend	Blink
F	> +60°C	Shut Down	Off

Note

Note that all temperatures stated above are ±2°C.

Appendix B: Approved Accessories

FKN4603A Cable 4.5FT (1.5M) DISPLAY-CPU

FKN4924A Cable 17FT (5.6M) DISPLAY-CPU (not compatible with SVGA display)

FKN4773A Cable 9.6FT (3.2M) DISPLAY-CPU

RLN4929 Vehicle mounting kit

RRA4194B 800 Mhz antenna

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